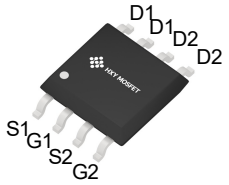
# DMN6040SSD

Dual N-Channel Enhancement Mode MOSFET

## Description

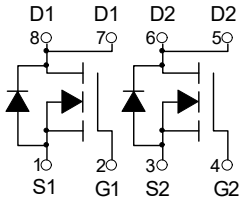
The DMN6040SSD uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.




SOP-8
(SOIC-8)

## General Features

$V_{DS}$ = 60V $I_D$ = 5A
$R_{DS(ON)}$ < 33mΩ @ $V_{GS}$=10 V
$R_{DS(ON)}$ < 43mΩ @ $V_{GS}$=4.5V




Dual N-Channel MOSFET

## Application

Battery protection

Load switch

Uninterruptible power supply

## Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| DMN6040SSD | SOP-8 | HXY MOSFET | 3000 |

## Absolute Maximum Ratings@$T_j$=25°C(unless otherwise specified)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 60 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_A$=25℃ | Drain Current, $V_{GS}$ @ 4.5V[3] | 5 | A |
| $I_D$@$T_A$=100℃ | Drain Current, $V_{GS}$ @ 4.5V[3] | 3.5 | A |
| $I_{DM}$ | Pulsed Drain Current[1] | 20 | A |
| $P_D$@$T_A$=25℃ | Total Power Dissipation | 1.5 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |
| Rthj-a | Maximum Thermal Resistance, Junction-ambient[3] | 85 | ℃/W |

## Electrical Characteristics ($T_A$=25℃unless otherwise noted)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain-Sourtce Breakdown Voltage | $V_{GS}$=0V,$I_D$=250μA | 60 | --- | --- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{GS}$=0V, $V_{DS}$=60V | --- | --- | 1 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0A | --- | --- | ±100 | nA |
| $V_{GS(th)}$ | Gate-Source Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=250μA | 1.5 | 1.57 | 2.5 | V |
| $R_{DS(ON)}$ | Drain-Source On Resistance[4] | $V_{GS}$=10V,$I_D$=4A | --- | 25 | 33 | mΩ |
| | | $V_{GS}$=4.5V,$I_D$=3A | --- | 33 | 43 | mΩ |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=15V, $V_{GS}$=0V, f=1MHz | --- | 1027 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 60 | -- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 45 | --- | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DS}$=30V, $I_D$=4A, $R_{ENG}$=3.3Ω,$V_{GS}$=10V | --- | 3 | --- | ns |
| $t_r$ | Rise Time | | --- | 34 | --- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | --- | 23 | --- | ns |
| $t_f$ | Fall Time | | --- | 6 | --- | ns |
| $Q_g$ | Total Gate Charge | $V_{GS}$=10V, $V_{DS}$=48V, $I_D$=4A | --- | 19 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 2.6 | --- | nC |
| $Q_{gd}$ | Gate-Drain “Miller” Charge | | --- | 4.1 | --- | nC |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V, $I_{SD}$=1A | --- | --- | 1.2 | V |
| $I_S$ | Continuous Drain Curren | $V_D$=$V_G$=0V | --- | --- | 5 | A |
| $I_{SM}$ | Pulsed Drain Current | | --- | --- | 20 | A |
| Trr | Reverse Recovery Time | $I_F$=4A,$T_J$=25℃ dI/dt=100A/us | --- | 12.1 | --- | ns |
| Qrr | Reverse Recovery Charge | | --- | 6.7 | --- | nC |

## Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : TJ=25℃,VDD=30V,VG=10V,L=0.1mH
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## Typical Characteristics

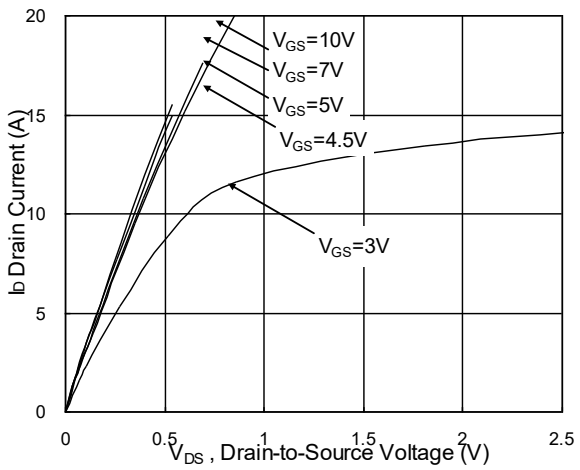



**Fig.1 Typical Output Characteristics**

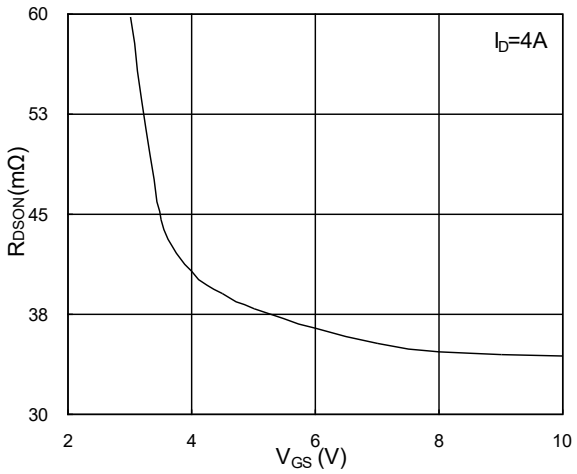



**Fig.2 On-Resistance vs. Gate-Source**

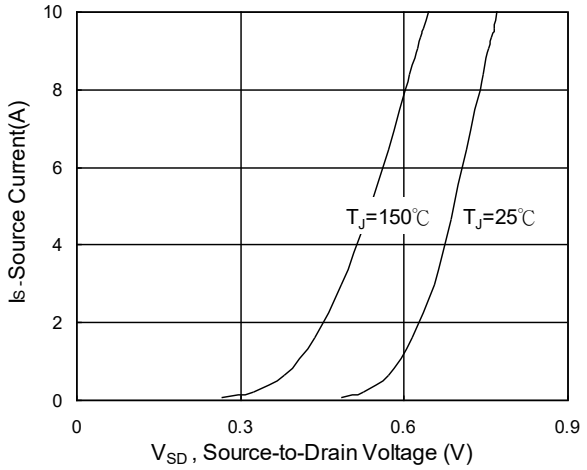



**Fig.3 Forward Characteristics Of Reverse**

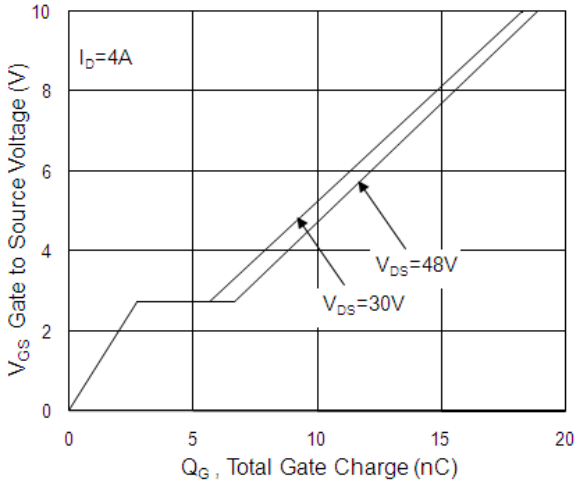



**Fig.4 Gate-Charge Characteristics**

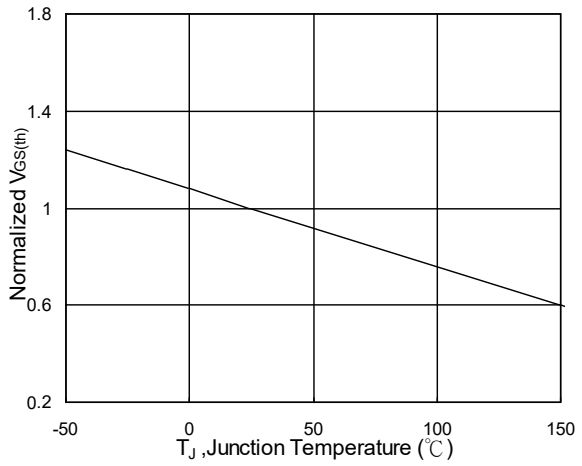



**Fig.5 Normalized $V_{GS(th)}$ vs. $T_J$**

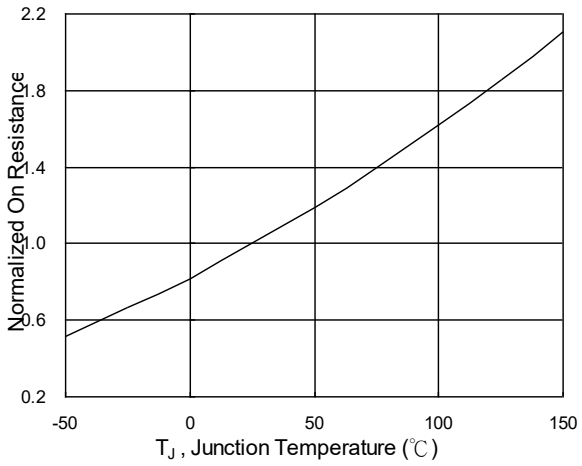



**Fig.6 Normalized $R_{DSON}$ vs. $T_J$**

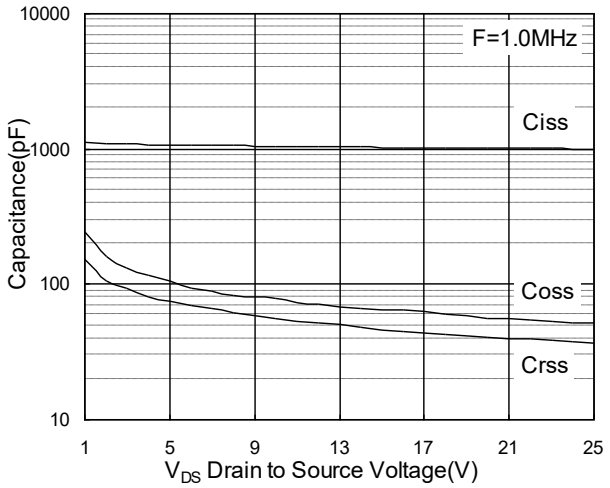



**Fig.7 Capacitance**

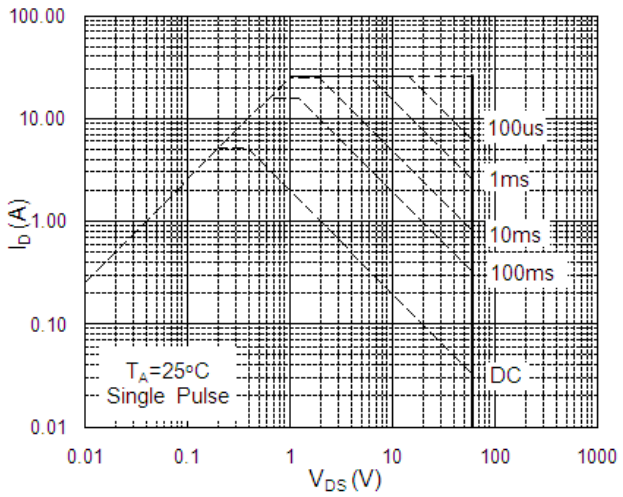



**Fig.8 Safe Operating Area**

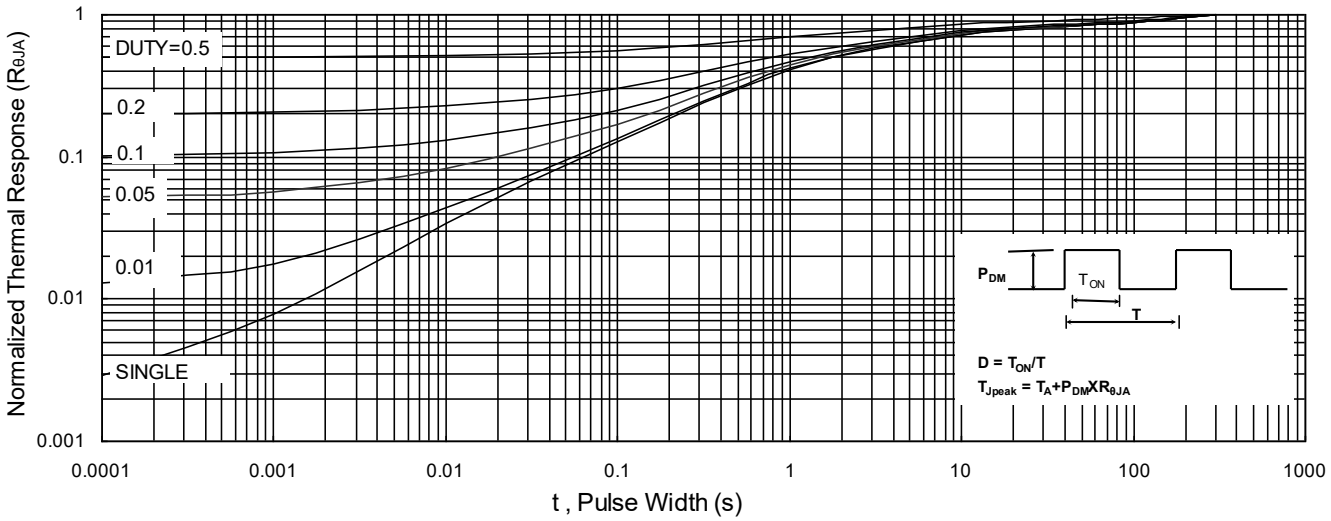



**Fig.9 Normalized Maximum Transient Thermal Impedance**

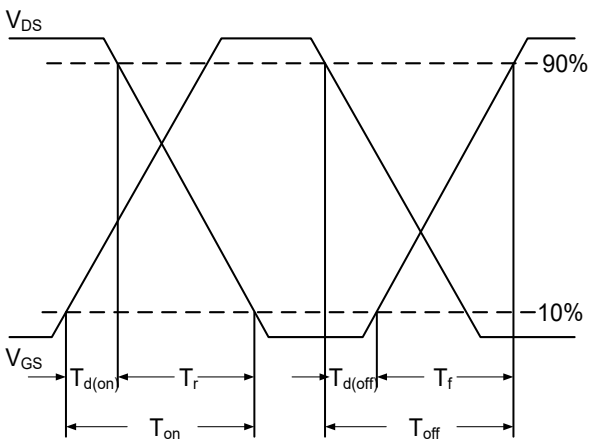



**Fig.10 Switching Time Waveform**

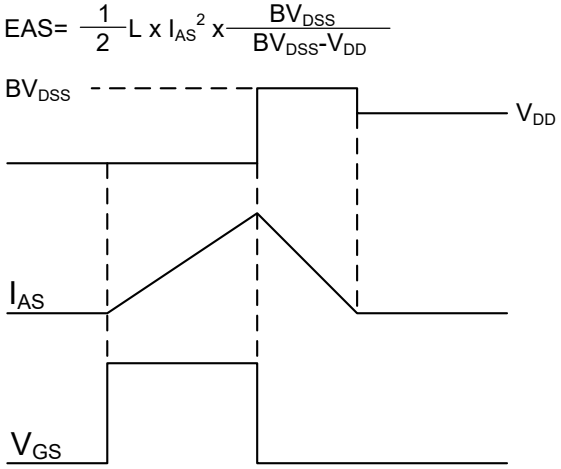
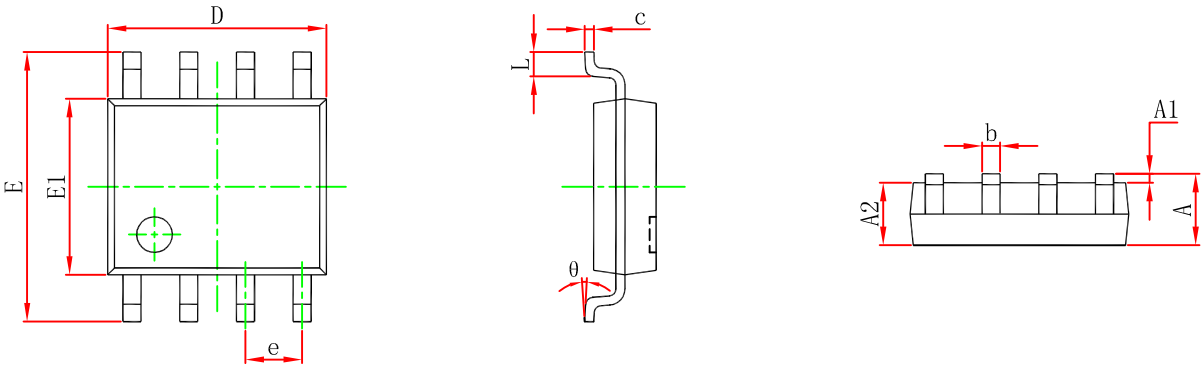
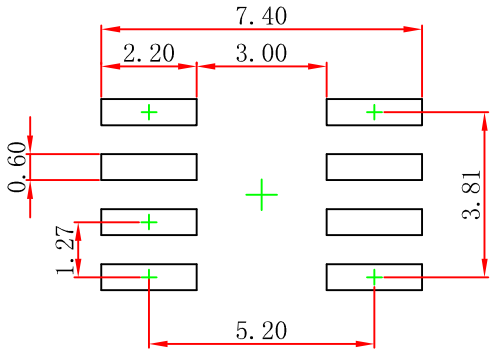



**Fig.11 Unclamped Inductive Switching Waveform**

## SOP-8 Package Outline Dimensions




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | **Min** | **Max** | **Min** | **Max** |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.007 | 0.010 |
| D | 4.800 | 5.000 | 0.189 | 0.197 |
| e | 1.270 (BSC) | | 0.050 (BSC) | |
| E | 5.800 | 6.200 | 0.228 | 0.244 |
| E1 | 3.800 | 4.000 | 0.150 | 0.157 |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |




Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.

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